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# SEQUENCE LISTING

<110> Lipton, Stuart A.  
Okamoto, Shu-ichi

<120> Methods of Differentiating and  
Protecting Cells By Modulating the P38/MEF2 Pathway

<130> 66654-622

<140> US 09/876,187

<141> 2001-06-05

<150> US 60/209,539

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1
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Gln Val Thr Phe Thr Lys Arg Lys Phe Gly Leu Met Lys Lys Ala Tyr
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gaa ctt agt gtg ctc tgt gac tgt gaa ata gca ctc atc att ttc aac 561
Glu Leu Ser Val Leu Cys Asp Cys Glu Ile Ala Leu Ile Ile Phe Asn
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Ser Ser Asn Lys Leu Phe Gln Tyr Ala Ser Thr Asp Met Asp Lys Val
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Ser Asp Ile Val Glu Ala Leu Asn Lys Lys Glu His Arg Gly Cys Asp	
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agc cca gac cct gat act tca tat gtg cta act cca cat aca gaa gaa	753
Ser Pro Asp Pro Asp Thr Ser Tyr Val Leu Thr Pro His Thr Glu Glu	
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aaa tat aaa aaa att aat gag gaa ttt gat aat atg atg cgg aat cat	801
Lys Tyr Lys Lys Ile Asn Glu Glu Phe Asp Asn Met Met Arg Asn His	
115 120 125	
aaa atc gca cct ggt ctg cca cct cag aac ttt tca atg tct gtc aca	849
Lys Ile Ala Pro Gly Leu Pro Pro Gln Asn Phe Ser Met Ser Val Thr	
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gtt cca gtg acc agc ccc aat gct ttg tcc tac act aac cca ggg agt	897
Val Pro Val Thr Ser Pro Asn Ala Leu Ser Tyr Thr Asn Pro Gly Ser	
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tca ctg gtg tcc cca tct ttg gca gcc agc tca acg tta aca gat tca	945
Ser Leu Val Ser Pro Ser Leu Ala Ala Ser Ser Thr Leu Thr Asp Ser	
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Ser Met Leu Ser Pro Pro Gln Thr Thr Leu His Arg Asn Val Ser Pro	
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Gly Ala Pro Gln Arg Pro Pro Ser Thr Gly Asn Ala Gly Gly Met Leu	
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Ser Thr Thr Asp Leu Thr Val Pro Asn Gly Ala Gly Ser Ser Pro Val	
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Thr Gly Ala Asn Ser Leu Gly Lys Val Met Pro Thr Lys Ser Pro Pro	
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Pro Pro Gly Gly Gly Asn Leu Gly Met Asn Ser Arg Lys Pro Asp Leu	
260 265 270	
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Ala Thr Gln Pro Leu Ala Thr Pro Val Val Ser Val Thr Thr Pro Ser	
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Leu Pro Pro Gln Gly Leu Val Tyr Ser Ala Met Pro Thr Ala Tyr Asn	
325 330 335	
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Thr Asp Tyr Ser Leu Thr Ser Ala Asp Leu Ser Ala Leu Gln Gly Phe	
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Asn Ser Pro Gly Met Leu Ser Leu Gly Gln Val Ser Ala Trp Gln Gln	
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His His Leu Gly Gln Ala Ala Leu Ser Ser Leu Val Ala Gly Gly Gln	
370 375 380 385	
tta tct cag ggt tcc aat tta tcc att aat acc aac caa aac atc agc	1617
Leu Ser Gln Gly Ser Asn Leu Ser Ile Asn Thr Asn Gln Asn Ile Ser	
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Ile Lys Ser Glu Pro Ile Ser Pro Pro Arg Asp Arg Met Thr Pro Ser	
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Gly Phe Gln Gln Gln Gln Gln Gln Gln Gln Gln Gln Gln Pro Pro Pro	
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Pro Pro Gln Pro Gln Pro Gln Pro Pro Gln Pro Gln Pro Arg Gln Glu	
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Met Gly Arg Ser Pro Val Asp Ser Leu Ser Ser Ser Ser Ser Tyr	
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Asp Gly Ser Asp Arg Glu Asp Pro Arg Gly Asp Phe His Ser Pro Ile	
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Val Leu Gly Arg Pro Pro Asn Thr Glu Asp Arg Glu Ser Pro Ser Val	
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Asn Ser Ser Asn Lys Leu Phe Gln Tyr Ala Ser Thr Asp Met Asp Lys
50 55 60
Val Leu Leu Lys Tyr Thr Glu Tyr Asn Glu Pro His Glu Ser Arg Thr
65 70 75 80
Asn Ser Asp Ile Val Glu Ala Leu Asn Lys Lys Glu His Arg Gly Cys
85 90 95
Asp Ser Pro Asp Pro Asp Thr Ser Tyr Val Leu Thr Pro His Thr Glu
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Glu Lys Tyr Lys Lys Ile Asn Glu Phe Asp Asn Met Met Arg Asn
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His Lys Ile Ala Pro Gly Leu Pro Pro Gln Asn Phe Ser Met Ser Val
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Thr Val Pro Val Thr Ser Pro Asn Ala Leu Ser Tyr Thr Asn Pro Gly
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Ser Ser Leu Val Ser Pro Ser Leu Ala Ala Ser Ser Thr Leu Thr Asp
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Pro Gly Ala Pro Gln Arg Pro Pro Ser Thr Gly Asn Ala Gly Gly Met
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Leu Ser Thr Thr Asp Leu Thr Val Pro Asn Gly Ala Gly Ser Ser Pro
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Val Gly Asn Gly Phe Val Asn Ser Arg Ala Ser Pro Asn Leu Ile Gly
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Ala Thr Gly Ala Asn Ser Leu Gly Lys Val Met Pro Thr Lys Ser Pro
245 250 255
Pro Pro Pro Gly Gly Gly Asn Leu Gly Met Asn Ser Arg Lys Pro Asp

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Phe Asn Ser Pro Gly Met Leu Ser Leu Gly Gln Val Ser Ala Trp Gln		
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Gln His His Leu Gly Gln Ala Ala Leu Ser Ser Leu Val Ala Gly Gly		
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Gln Leu Ser Gln Gly Ser Asn Leu Ser Ile Asn Thr Asn Gln Asn Ile		
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Ser Ile Lys Ser Glu Pro Ile Ser Pro Pro Arg Asp Arg Met Thr Pro		
405	410	415
Ser Gly Phe Gln Gln Gln Gln Gln Gln Gln Gln Gln Gln Pro Pro		
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Pro Pro Pro Gln Pro Gln Pro Gln Pro Pro Gln Pro Gln Pro Arg Gln		
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Glu Met Gly Arg Ser Pro Val Asp Ser Leu Ser Ser Ser Ser Ser Ser		
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Tyr Asp Gly Ser Asp Arg Glu Asp Pro Arg Gly Asp Phe His Ser Pro		
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 Met Gly Arg Lys Lys Ile Gln Ile Ser Arg  
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 atc ctg gac caa agg aat cgg cag gtg acg ttc acc aag cgg aag ttc 520  
 Ile Leu Asp Gln Arg Asn Arg Gln Val Thr Phe Thr Lys Arg Lys Phe  
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Gly Leu Met Lys Lys Ala Tyr Glu Leu Ser Val Leu Cys Asp Cys Glu	
30 35 40	
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Ile Ala Leu Ile Ile Phe Asn Ser Ala Asn Arg Leu Phe Gln Tyr Ala	
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Ser Thr Asp Met Asp Arg Val Leu Leu Lys Tyr Thr Glu Tyr Ser Glu	
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Pro His Glu Ser Arg Thr Asn Thr Asp Ile Leu Glu Thr Leu Lys Arg	
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Arg Gly Ile Gly Leu Asp Gly Pro Glu Leu Glu Pro Asp Glu Gly Pro	
95 100 105	
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Glu Glu Pro Gly Glu Lys Phe Arg Arg Leu Ala Gly Glu Gly Gly Asp	
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ccg gcc ttg ccc cga ccc cgg ctg tat cct gca gct cct gct atg ccc	856
Pro Ala Leu Pro Arg Pro Arg Leu Tyr Pro Ala Ala Pro Ala Met Pro	
125 130 135	
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Ser Pro Asp Val Val Tyr Gly Ala Leu Pro Pro Pro Gly Cys Asp Pro	
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agt ggg ctt ggg gaa gca ctg ccc gcc cag agc cgc cca tct ccc ttc	952
Ser Gly Leu Gly Glu Ala Leu Pro Ala Gln Ser Arg Pro Ser Pro Phe	
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Arg Pro Ala Ala Pro Lys Ala Gly Pro Pro Gly Leu Val His Pro Leu	
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Pro Thr Glu Gly Arg Arg Ser Asp Leu Pro Gly Gly Leu Ala Gly Pro	
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Arg Gly Gly Leu Asn Thr Ser Arg Ser Leu Tyr Ser Gly Leu Gln Asn	
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 Gly Leu Gly Pro Pro Cys Ala Gly Cys Pro Trp Pro Thr Ala Gly Pro  
                     315                    320                    325                    330

ggt agg aga tca ccc ggt ggc acc agc cca gag cgc tcg cca ggt acg 1480  
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gcg agg gca cgt ggg gac ccc acc tcc ctc cag gcc tct tca gag aag 1528  
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acc caa cag tgacgcccc ctcgcgggtg ggggcttgga ggtgggcggc 1577  
 Thr Gln Gln  
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 Tyr Glu Leu Ser Val Leu Cys Asp Cys Glu Ile Ala Leu Ile Ile Phe  
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 Val Leu Leu Lys Tyr Thr Glu Tyr Ser Glu Pro His Glu Ser Arg Thr  
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 Gly Pro Glu Leu Glu Pro Asp Glu Gly Pro Glu Glu Pro Gly Glu Lys  
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 Phe Arg Arg Leu Ala Gly Glu Gly Asp Pro Ala Leu Pro Arg Pro  
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Leu	Cys	Asp	Cys	Glu	Ile	Ala	Leu	Ile	Ile	Phe	Asn	Ser	Thr	Asn	Lys	
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Leu	Phe	Gln	Tyr	Ala	Ser	Thr	Asp	Met	Asp	Lys	Val	Leu	Leu	Lys	Tyr	
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Glu	Thr	Leu	Arg	Lys	Lys	Gly	Leu	Asn	Gly	Cys	Asp	Ser	Pro	Asp	Pro	
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gat	gcg	gac	gat	tcc	gta	ggc	cac	agc	cct	gag	tct	gag	gac	aag	tac	752
Asp	Ala	Asp	Asp	Ser	Val	Gly	His	Ser	Pro	Glu	Ser	Glu	Asp	Lys	Tyr	
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Cys	Ala	Val	Pro	Pro	Pro	Asn	Phe	Glu	Met	Pro	Val	Ser	Ile	Pro	Val	
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tcc	agc	cac	aac	agt	ttg	gtg	tac	agc	aac	cct	gtc	agc	tca	ctg	gga	896
Ser	Ser	His	Asn	Ser	Leu	Val	Tyr	Ser	Asn	Pro	Val	Ser	Ser	Leu	Gly	
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Asn	Pro	Asn	Leu	Leu	Pro	Leu	Ala	His	Pro	Ser	Leu	Gln	Arg	Asn	Ser	
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Met	Ser	Pro	Gly	Val	Thr	His	Arg	Pro	Pro	Ser	Ala	Gly	Asn	Thr	Gly	
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ggc	ctg	atg	ggc	gga	gac	ctc	acg	tct	ggc	gca	ggc	acc	agt	gca	ggg	1040
Gly	Leu	Met	Gly	Gly	Asp	Leu	Thr	Ser	Gly	Ala	Gly	Thr	Ser	Ala	Gly	
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Asn	Gly	Tyr	Gly	Asn	Pro	Arg	Asn	Ser	Pro	Gly	Leu	Leu	Val	Ser	Pro	
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ggc	aac	ttg	aac	aag	aat	atg	caa	gca	aaa	tct	cct	ccc	cca	atg	aat	1136
Gly	Asn	Leu	Asn	Lys	Asn	Met	Gln	Ala	Lys	Ser	Pro	Pro	Pro	Met	Asn	
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tta	gga	atg	aat	aac	cgt	aaa	cca	gat	ctc	cga	gtt	ctt	att	cca	cca	1184

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Gly Ser Lys Asn Thr Met Pro Ser Val Ser Glu Asp Val Asp Leu Leu	
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ttg aat caa agg ata aat aac tcc cag tcg gct cag tca ttg gct acc	1280
Leu Asn Gln Arg Ile Asn Asn Ser Gln Ser Ala Gln Ser Leu Ala Thr	
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cca gtg gtt tcc gta gca act cct act tta cca gga caa gga atg gga	1328
Pro Val Val Ser Val Ala Thr Pro Thr Leu Pro Gly Gln Gly Met Gly	
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Gly Tyr Pro Ser Ala Ile Ser Thr Thr Tyr Gly Thr Glu Tyr Ser Leu	
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Ser Ser Ala Asp Leu Ser Ser Leu Ser Gly Phe Asn Thr Ala Ser Ala	
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Leu His Leu Gly Ser Val Thr Gly Trp Gln Gln Gln His Leu His Asn	
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Met Pro Pro Ser Ala Leu Ser Gln Leu Gly Ala Cys Thr Ser Thr His	
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Leu Ser Gln Ser Ser Asn Leu Ser Leu Pro Ser Thr Gln Ser Leu Asn	
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atc aag tca gaa cct gtt tct cct cct aga gac cgt acc acc acc cct	1616
Ile Lys Ser Glu Pro Val Ser Pro Pro Arg Asp Arg Thr Thr Thr Pro	
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Ser Arg Tyr Pro Gln His Thr Arg His Glu Ala Gly Arg Ser Pro Val	
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Asp Ser Leu Ser Ser Cys Ser Ser Ser Tyr Asp Gly Ser Asp Arg Glu	
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Asp His Arg Asn Glu Phe His Ser Pro Ile Gly Leu Thr Arg Pro Ser	
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Pro Asp Glu Arg Glu Ser Pro Ser Val Lys Arg Met Arg Leu Ser Glu	
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Gly Trp Ala Thr  
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<210> 6

<211> 473

<212> PRT

<213> Homo sapiens

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Val Leu Leu Lys Tyr Thr Glu Tyr Asn Glu Pro His Glu Ser Arg Thr
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Asp	Val	Asp	Leu	Leu	Leu	Asn	Gln	Arg	Ile	Asn	Asn	Ser	Gln	Ser	Ala	
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Gln	Ser	Leu	Ala	Thr	Pro	Val	Val	Ser	Val	Ala	Thr	Pro	Thr	Leu	Pro	
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Gly	Gln	Gly	Met	Gly	Gly	Tyr	Pro	Ser	Ala	Ile	Ser	Thr	Thr	Tyr	Gly	
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Thr	Glu	Tyr	Ser	Leu	Ser	Ser	Ala	Asp	Leu	Ser	Ser	Leu	Ser	Gly	Phe	
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Asn	Thr	Ala	Ser	Ala	Leu	His	Leu	Gly	Ser	Val	Thr	Gly	Trp	Gln	Gln	
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Gln	His	Leu	His	Asn	Met	Pro	Pro	Ser	Ala	Leu	Ser	Gln	Leu	Gly	Ala	
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Cys	Thr	Ser	Thr	His	Leu	Ser	Gln	Ser	Ser	Asn	Leu	Ser	Leu	Pro	Ser	
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Thr	Gln	Ser	Leu	Asn	Ile	Lys	Ser	Glu	Pro	Val	Ser	Pro	Pro	Arg	Asp	
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Gly	Arg	Ser	Pro	Val	Asp	Ser	Leu	Ser	Ser	Cys	Ser	Ser	Ser	Tyr	Asp	
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Gly	Ser	Asp	Arg	Glu	Asp	His	Arg	Asn	Glu	Phe	His	Ser	Pro	Ile	Gly	
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Leu	Thr	Arg	Pro	Ser	Pro	Asp	Glu	Arg	Glu	Ser	Pro	Ser	Val	Lys	Arg	
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<210> 7

<211> 1919

<212> DNA

<213> Homo sapiens

<220>

<221> CDS

<222> (196)...(1761)

<400> 7

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Asp Glu Arg Asn Arg Gln Val Thr Phe Thr Lys Arg Lys Phe Gly Leu
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atg aag aag gcg tat gag ctg agc gtg cta tgt gac tgc gag atc gca 327
Met Lys Lys Ala Tyr Glu Leu Ser Val Leu Cys Asp Cys Glu Ile Ala
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ctc atc atc ttc aac cac tcc aac aag ctg ttc cag tac gcc agc acc 375
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Asp Met Asp Lys Val Leu Leu Lys Tyr Thr Glu Tyr Asn Glu Pro His
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gag agc cgc acc aac gcc gac atc atc gag acc ctg agg aag aag ggc 471
Glu Ser Arg Thr Asn Ala Asp Ile Ile Glu Thr Leu Arg Lys Lys Gly
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ttc aat ggc tgc gac agc ccc gag ccc gac ggg gag gac tcg ctg gaa 519
Phe Asn Gly Cys Asp Ser Pro Glu Pro Asp Gly Glu Asp Ser Leu Glu
      95             100                    105

cag agc ccc ctg ctg gag gac aag tac cga cgc gcc agc gag gag ctc 567
Gln Ser Pro Leu Leu Glu Asp Lys Tyr Arg Arg Ala Ser Glu Glu Leu
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gac ggg ctc ttc cgg cgc tat ggg tca act gtc ccg gcc ccc aac ttt 615
Asp Gly Leu Phe Arg Arg Tyr Gly Ser Thr Val Pro Ala Pro Asn Phe
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gcc atg cct gtc acg gtg ccc gtg tcc aat cag agc tca ctg cag ttc 663
Ala Met Pro Val Thr Val Pro Val Ser Asn Gln Ser Ser Leu Gln Phe
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Ser Asn Pro Ser Gly Ser Leu Val Thr Pro Ser Leu Val Thr Ser Ser
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ctc acg gac ccg cgg ctc ctg tcc ccc cag cag cca gca cta cag agg 759
Leu Thr Asp Pro Arg Leu Leu Ser Pro Gln Gln Pro Ala Leu Gln Arg
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aac agt gtg tct cct ggc ctg ccc cag cgg cca gct agt gcg ggg gcc 807

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gtt ggg aat ggc tac gtc agt gct cgg gct tcc cct ggc ctc ctc cct	903
Val Gly Asn Gly Tyr Val Ser Ala Arg Ala Ser Pro Gly Leu Leu Pro	
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gtg gcc aat ggc aac agc cta aac aag gtc atc cct gcc aag tct ccg	951
Val Ala Asn Gly Asn Ser Leu Asn Lys Val Ile Pro Ala Lys Ser Pro	
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ccc cca cct acc cac agc acc cag ctt gga gcc ccc agc cgc aag ccc	999
Pro Pro Pro Thr His Ser Thr Gln Leu Gly Ala Pro Ser Arg Lys Pro	
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Asp Leu Arg Val Ile Thr Ser Gln Ala Gly Lys Gly Leu Met His His	
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Leu Thr Glu Asp His Leu Asp Leu Asn Asn Ala Gln Arg Leu Gly Val	
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Tyr Asn Thr Asp Tyr Gln Leu Thr Ser Ala Glu Leu Ser Ser Leu Pro	
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gcc ttt agt tca cct ggg ggg ctg tcg cta ggc aat gtc act gcc tgg	1287
Ala Phe Ser Ser Pro Gly Gly Leu Ser Leu Gly Asn Val Thr Ala Trp	
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Gln Gln Pro Gln Gln Pro Gln Gln Pro Gln Gln Pro Gln Pro Pro Gln	
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Gln Gln Pro Pro Gln Pro Gln Gln Pro Gln Pro Gln Gln Pro Gln Gln	
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Pro Gln Gln Pro Pro Gln Gln Gln Ser His Leu Val Pro Val Ser Leu	
400 405 410	
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Ser Asn Leu Ile Pro Gly Ser Pro Leu Pro His Val Gly Ala Ala Leu	

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Thr Val Thr Thr His Pro His Ile Ser Ile Lys Ser Glu Pro Val Ser			
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Ala Ala Arg Pro Glu Pro Gly Asp Gly Leu Ser Ser Pro Ala Gly Gly			
465	470	475	
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Ser Tyr Glu Thr Gly Asp Arg Asp Asp Gly Arg Gly Asp Phe Gly Pro			
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Thr Leu Gly Leu Leu Arg Pro Ala Pro Glu Pro Glu Ala Glu Gly Ser			
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Ala Val Lys Arg Met Arg Leu Asp Thr Trp Thr Leu Lys *			
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<211> 521

<212> PRT

<213> Homo sapiens

<400> 8

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Asp Ser Pro Glu Pro Asp Gly Glu Asp Ser Leu Glu Gln Ser Pro Leu	
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115 120 125	
Arg Arg Tyr Gly Ser Thr Val Pro Ala Pro Asn Phe Ala Met Pro Val	
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Thr Val Pro Val Ser Asn Gln Ser Ser Leu Gln Phe Ser Asn Pro Ser	
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Gly	Asp	Arg	Asp	Asp	Gly	Arg	Gly	Asp	Phe	Gly	Pro	Thr	Leu	Gly	Leu		
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Leu	Arg	Pro	Ala	Pro	Glu	Pro	Glu	Ala	Glu	Gly	Ser	Ala	Val	Lys	Arg		
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